

U-Space Competition

(University Spaceflight Competition)

Brian Gilchrist, Rafael Ramos

brian.gilchrist@umich.edu

University of Michigan

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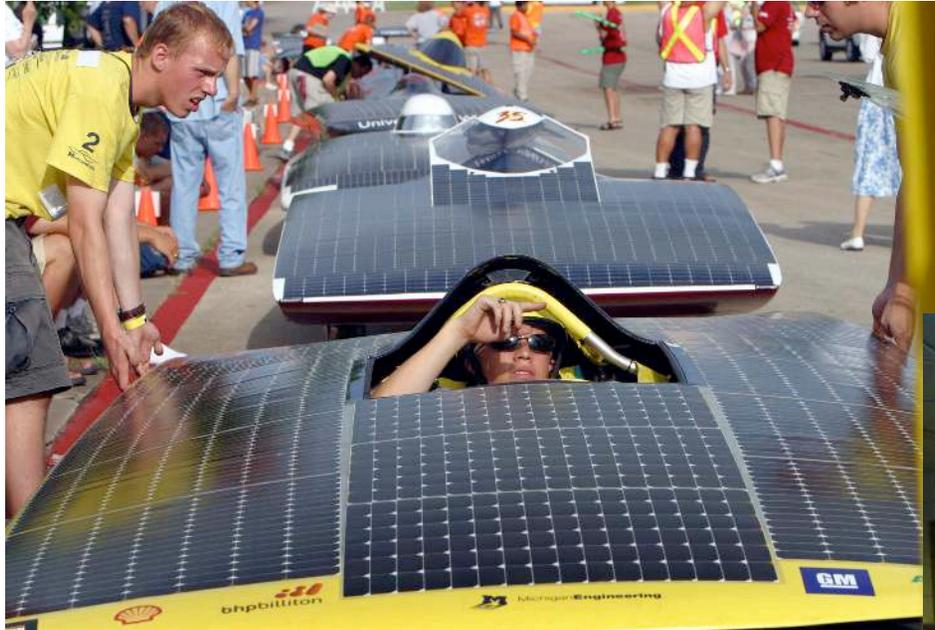


Jump starting the next generation of space professionals careers today!

Challenges

- Finding ways to attract, excite and train new generations of aerospace professionals and train them to think in new ways
- Creating exciting in-space student experience opportunities with broad access given access to space is expensive and limited
 - Typically requires considerable commitment of time and effort

Building on what we know works



Students can build small exciting spacecraft, but launch costs can be huge!

Students regularly build and privately fund *million-dollar* class solar cars for national International *competitions*



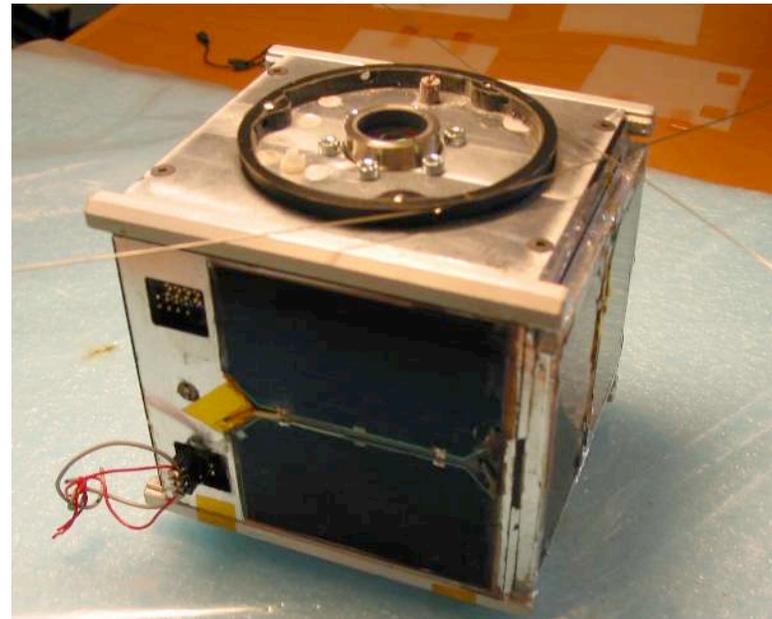
The solution to the cost challenge is to think small

- Nano-sat (~1kg, 10x10x10cm) spacecraft called Cubesats address launch cost
 - A Cubesat launch is in the \$40k-\$50k range
 - Flying multiple cubesats at one time is feasible (Max? 24? 30?)
 - *This is a cost level where private funding of launch costs is feasible!*
- Spacecraft mass and volume constraints mean innovation, miniaturization, and sophistication are essential to win a competition



Students work in inexpensive, cube-shaped satellites, or CubeSats.

AAU Cubesat
University of
Aalborg,
Denmark



A Possible U-Space Competition



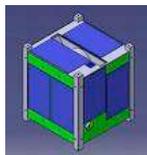
- Teams fund, design, build, test, and compete with a Cubesat that are launched together
 - Funding includes launch costs
- Competition goals would involve successful collection and analysis of required data
 - e.g. successful *operation* and data *transmission* to ground over TBD weeks
 - Example - collection of pre-defined Earth observations
- Public outreach



In-Space Operations



Tracking & Data Collection



Integration & Launch

Design, Build, Test

Media and Press Coverage



U-Space Challenge *Possible Constraints*



- Each team must use a single Cubesat (1U) for its in-space element
- Funding of Cubesat, its flight, and operations would be each team's responsibility
 - Competition sponsorship could help lower costs
- Team must use their own transportable telemetry and commanding ground station
- Same ground station must be operated from at least two locations separated by a minimum TBD distance during the competition
- Orbit details would be preliminary and only finalized once a specific launch has been defined

Possible U-Space Challenge Scenario: 4 phases



- Phase 0: Teams Selection “Competition”
 - Passing this milestone reserves a launch space
- Phase I: Cubesat Design, Build and *Flight Competition Review* (FCR)
 - Each *university* participates by constructing flight unit
 - Ends in official Cubesat FCR
 - Each Cubesat gets a “Go/No Go” official result
- Phase II: Cubesat Test, Integration, and Launch
- Phase III: U-Space In-Space Challenge



There are practical questions needing an answer to know if U-Space is feasible, e.g.

- How will spacecraft communications for each team be handled?
- What orbital constraints will be required for competition?
- How will Cubesat launcher integration logistics be handled?
- What are the practical limits to the number of Cubesats flown at once?
- Should this be limited to educational institutions?

What needs to happen next?

- Get community feedback, generate interest
- Create a more complete model of the proposed U-Space Challenge
- Generate a better understanding of competition costs and schedule